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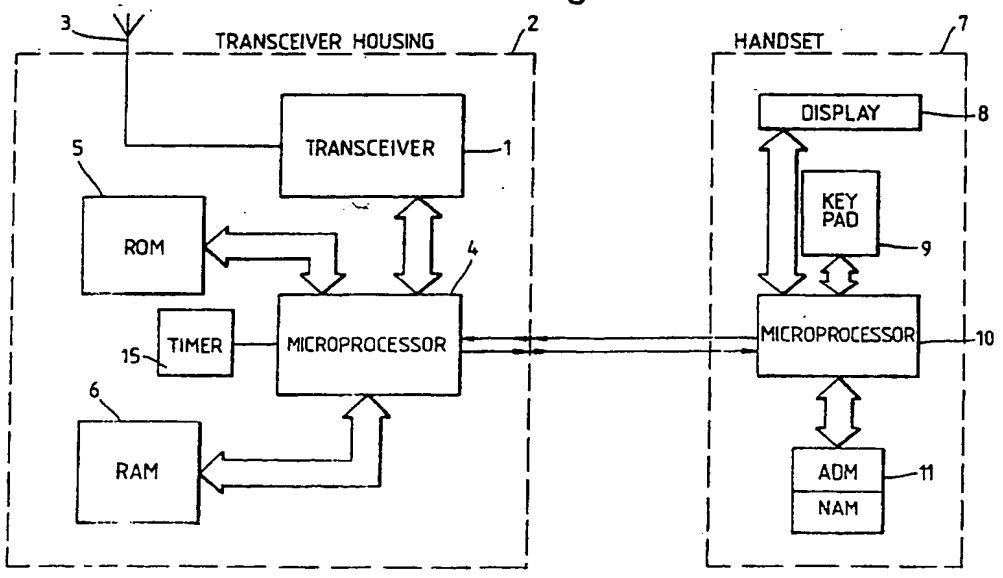
(54) Telephone with speed dialing

(57) A telephone, e.g. a mobile telephone, has a standard set of telephone dialing digit keys (9a) for the numeric digits 0, 1 ... 9 and the characters "*" and "#". The telephone also includes an abbreviated dialing memory (11) for speed dialing. Predetermined ones of the dialing digit keys (9a) have a dual function for one-touch speed dialing. If any of these predetermined keys is pressed for a period of time less than a threshold value, the normal digit associated with that key is selected, e.g. for regular dialing purposes. On the other hand, if one of the predetermined keys is pressed for a period of time equal to or exceeding the threshold value then a telephone number is retrieved from a predetermined memory location and a call to the retrieved telephone number is automatically initiated without pressing any further keys. For example, when the "*" or "#" keys are pressed for more than 2 seconds a call is initiated to a pre-programmed number stored at a respective predetermined location in the abbreviated dialing memory (11). If the "9" or "0" is pressed for more than 2 seconds a call is automatically initiated to a pre-stored emergency number or operator number respectively.

Fig.1.



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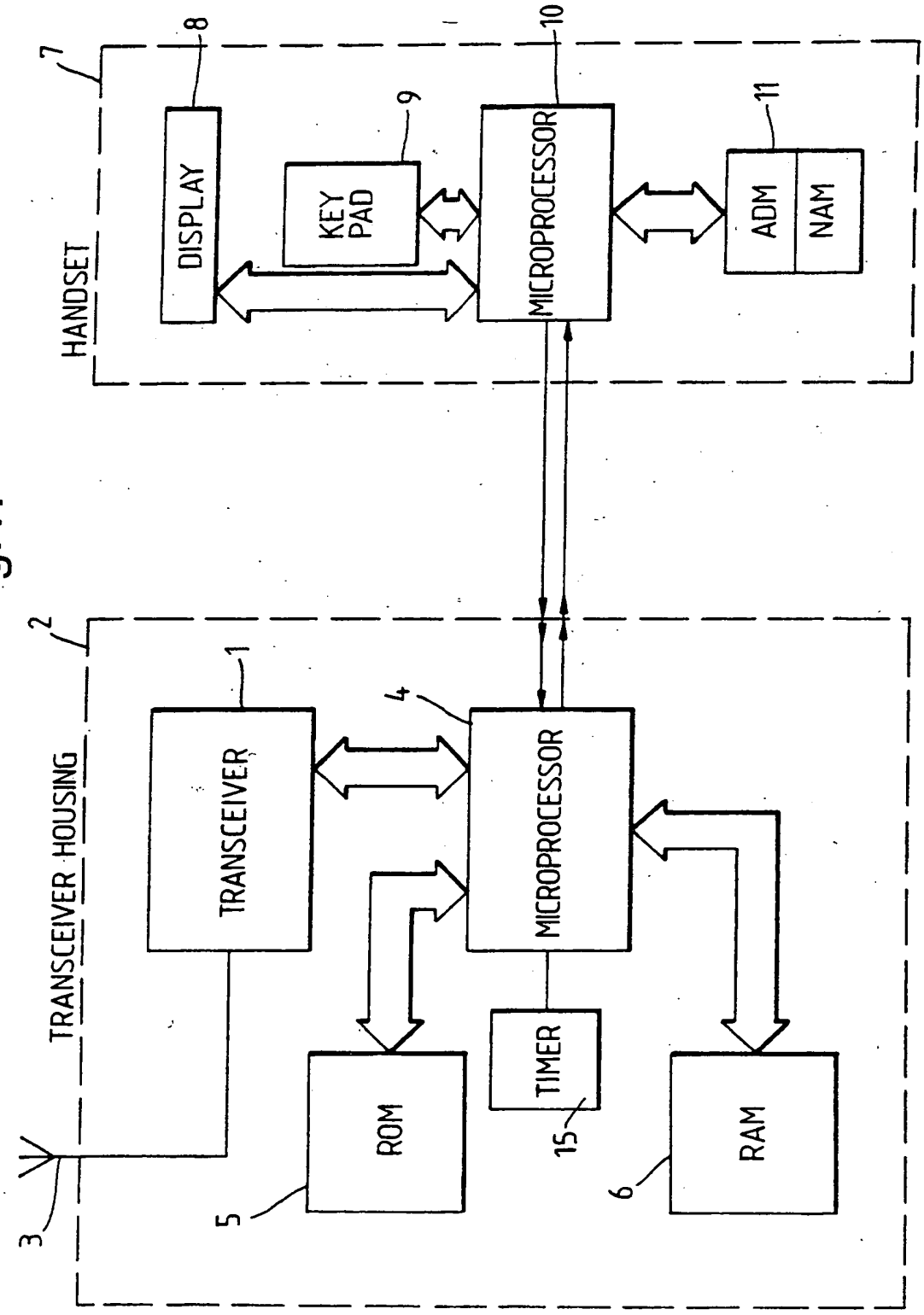

HANDSET
7
DISPLAY
8
KEY PAD
9
MICROPROCESSOR
10
ADM
NAM
11
TRANSCEIVER HOUSING
2
TRANSCEIVER
1
4
MICROPROCESSOR
ROM
5
TIMER
15
RAM
6
3

Fig.1.

Fig.2.

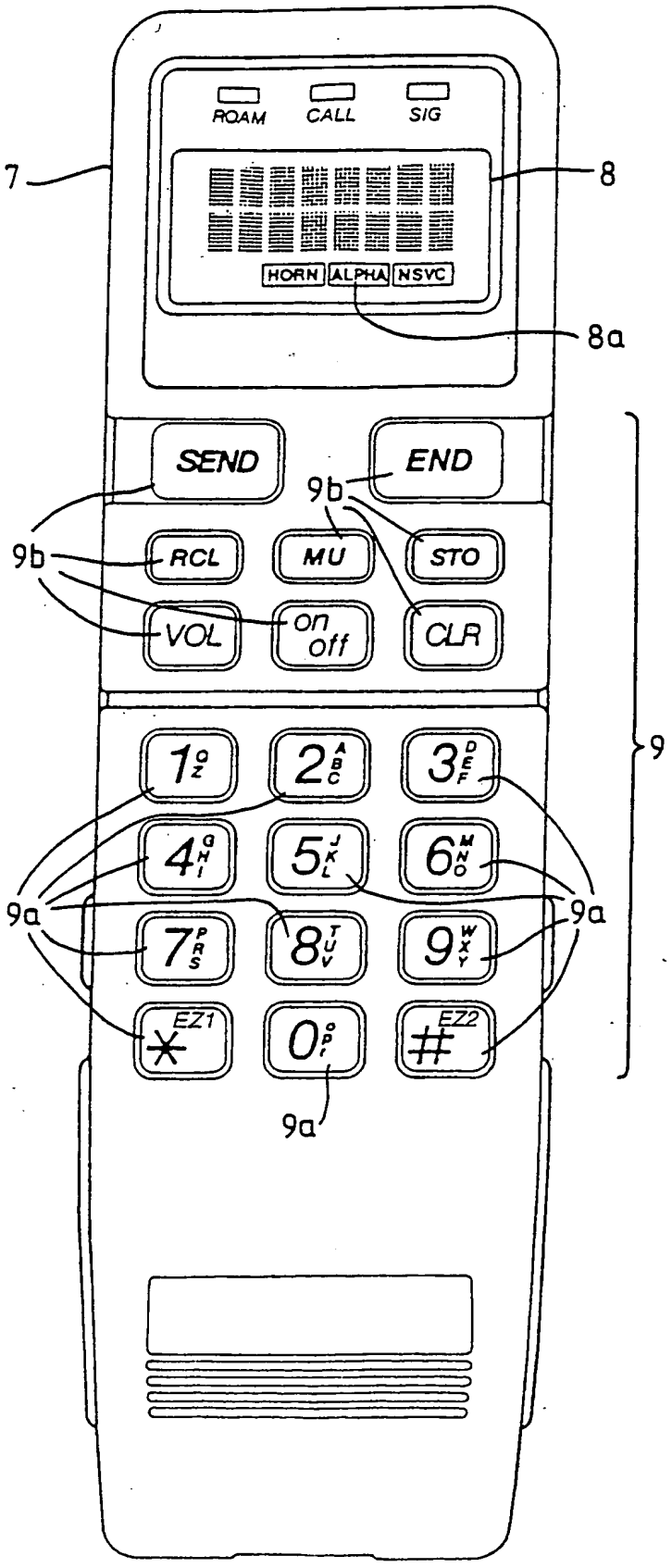
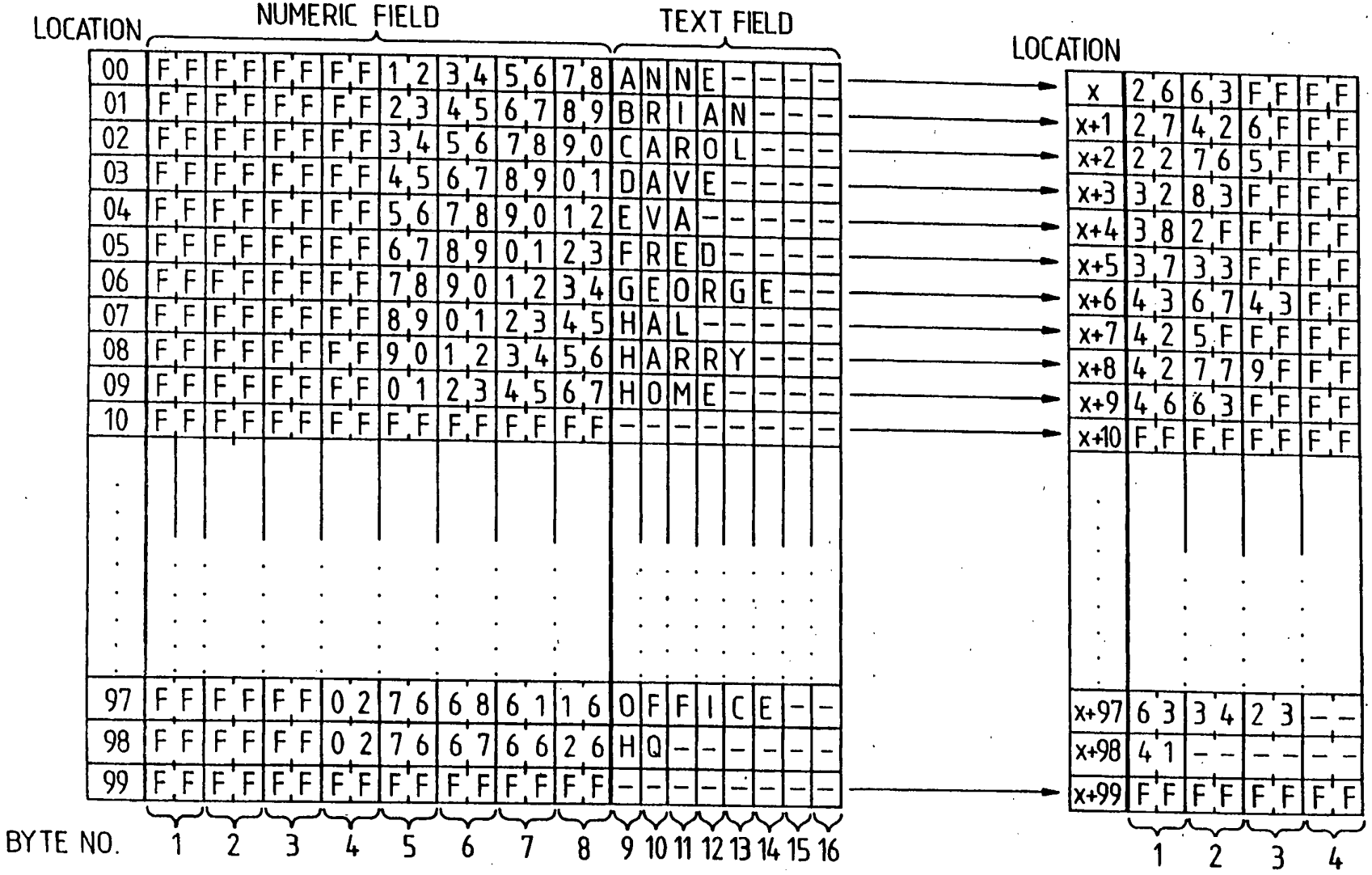

ROAM
CALL
SIG
HORN
ALPHA
NSVC
7
8
8a
SEND
END
9b
RCL
MU
STO
VOL
on off
CLR
1 Q Z
2 A B C
3 D E F
4 G H I
5 J K L
6 M N O
7 P R S
8 T U V
9 W X Y
EZ1
0 O P
EZ2
9
9a

Fig.3.


ADM (11)
RAM (6)
LOCATION
NUMERIC FIELD
TEXT FIELD
LOCATION
00 FF FF FF FF 12 34 56 78 ANNE ----
01 FF FF FF FF 23 45 67 89 BRIAN ---
02 FF FF FF FF 34 56 78 90 CAROL ---
03 FF FF FF FF 45 67 89 01 DAVE ----
04 FF FF FF FF 56 78 90 12 EVA -----
05 FF FF FF FF 67 89 01 23 FRED ----
06 FF FF FF FF 78 90 12 34 GEORGE --
07 FF FF FF FF 89 01 23 45 HAL -----
08 FF FF FF FF 90 12 34 56 HARRY ---
09 FF FF FF FF 01 23 45 67 HOME ----
10 FF FF FF FF FF FF FF FF ----------
97 FF FF FF 02 76 68 61 16 OFFICE --
98 FF FF FF 02 76 67 66 26 HQ ------
99 FF FF FF FF FF FF FF FF ----------
x 26 63 FF FF
x+1 27 42 6F FF
x+2 22 76 5F FF
x+3 32 83 FF FF
x+4 38 2F FF FF
x+5 37 33 FF FF
x+6 43 67 43 FF
x+7 42 5F FF FF
x+8 42 77 9F FF
x+9 46 63 FF FF
x+10 FF FF FF FF
x+97 63 34 23 --
x+98 41 -- -- --
x+99 FF FF FF FF
BYTE NO. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1 2 3 4

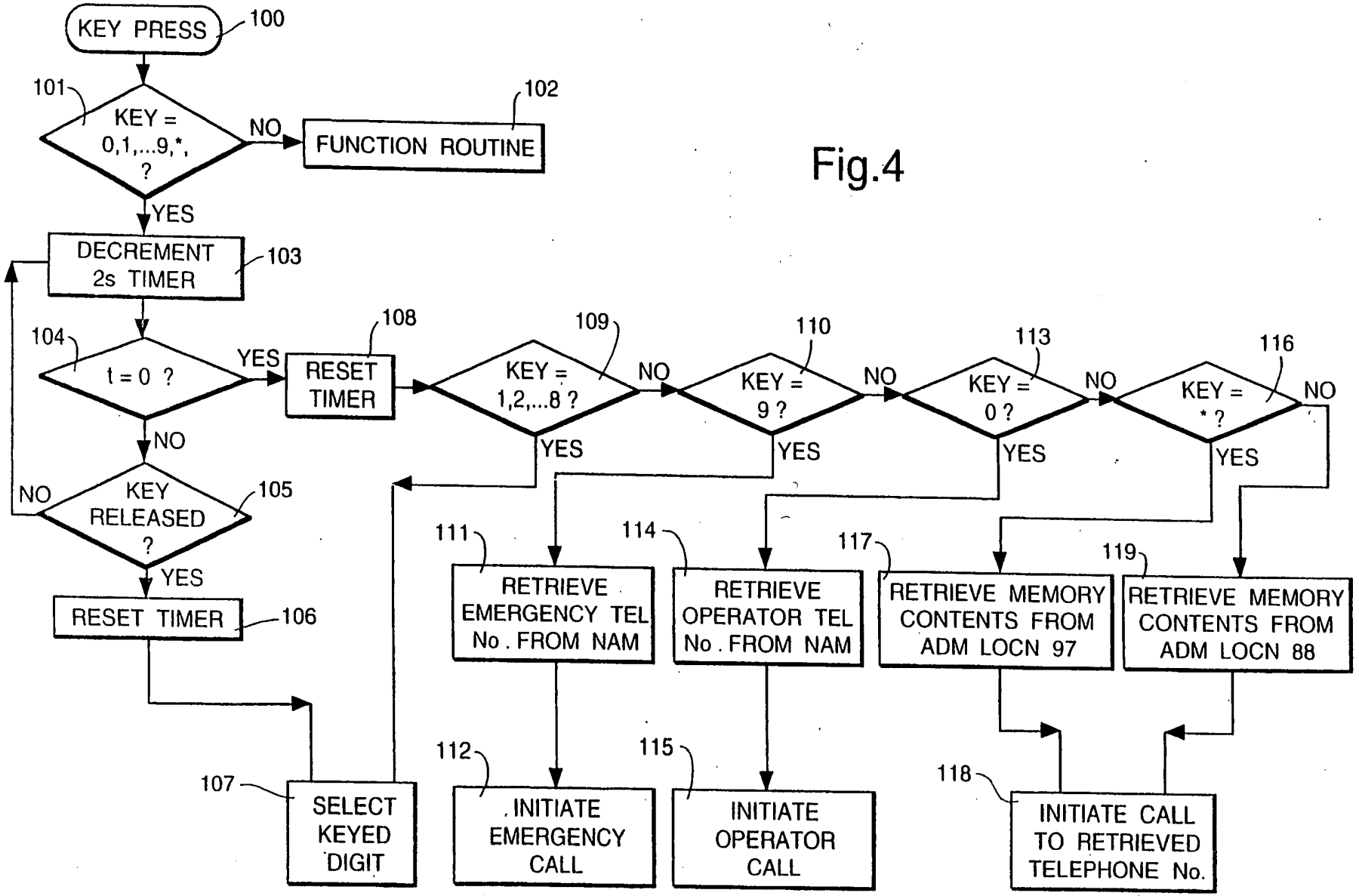
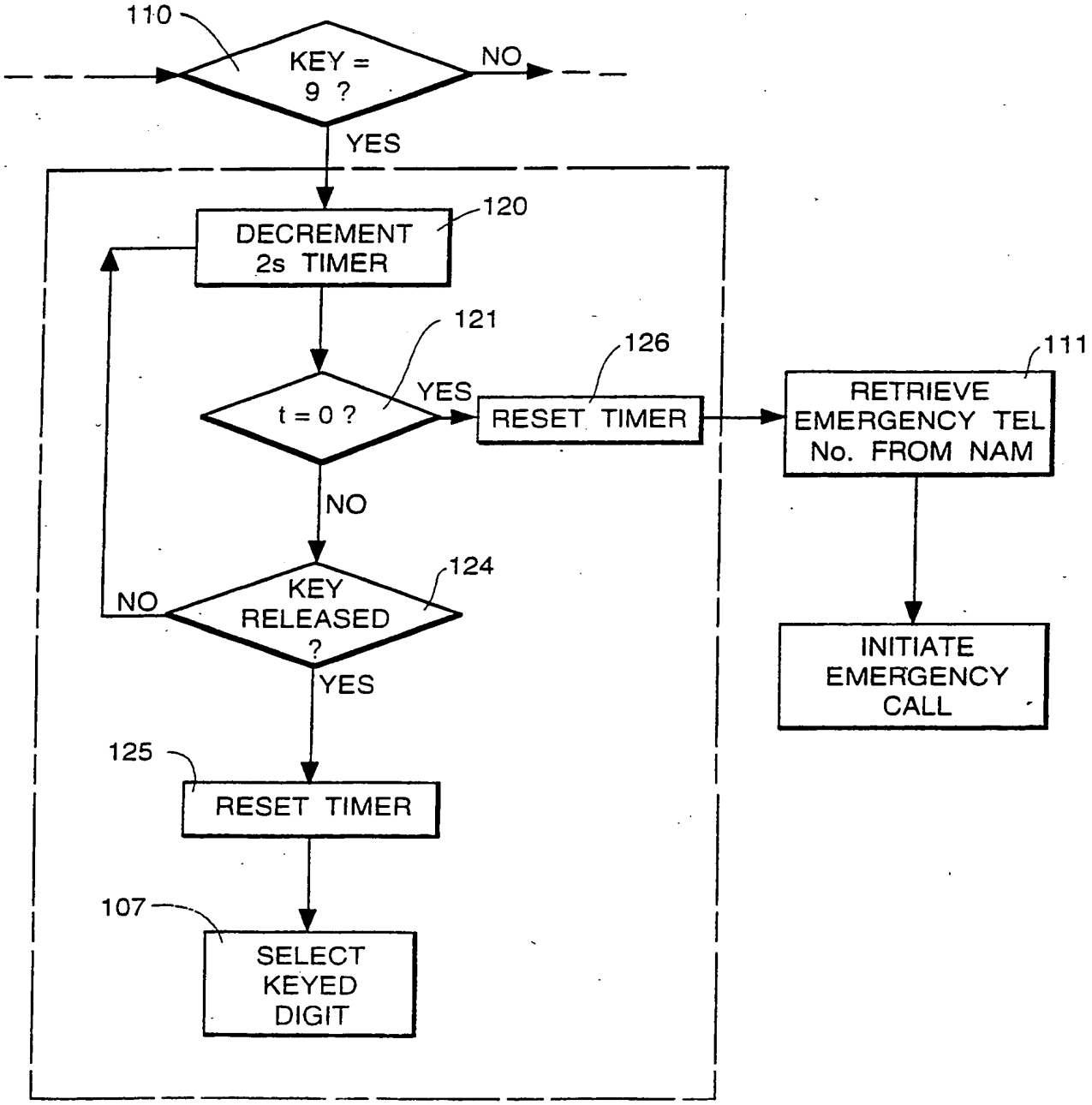

KEY PRESS
100
101
KEY = 0,1,...9,*, ?
NO
102
FUNCTION ROUTINE
YES
DECREMENT 2s TIMER
103
104
t = 0 ?
YES
108
RESET TIMER
109
KEY = 1,2,...8 ?
NO
110
KEY = 9 ?
NO
113
KEY = 0 ?
NO
116
KEY = * ?
NO
NO
KEY RELEASED ?
105
YES
RESET TIMER
106
YES
YES
YES
YES
111
RETRIEVE EMERGENCY TEL No. FROM NAM
114
RETRIEVE OPERATOR TEL No. FROM NAM
117
RETRIEVE MEMORY CONTENTS FROM ADM LOCN 97
119
RETRIEVE MEMORY CONTENTS FROM ADM LOCN 88
107
SELECT KEYED DIGIT
112
INITIATE EMERGENCY CALL
115
INITIATE OPERATOR CALL
118
INITIATE CALL TO RETRIEVED TELEPHONE No.

Fig.4

Fig.5


110
KEY = 9 ?
NO
YES
120
DECREMENT 2s TIMER
121
t = 0 ?
YES
126
RESET TIMER
111
RETRIEVE EMERGENCY TEL No. FROM NAM
INITIATE EMERGENCY CALL
NO
124
KEY RELEASED ?
NO
YES
125
RESET TIMER
107
SELECT KEYED DIGIT

Telephone with Speed Dialing

This invention relates to a telephone particularly, but not exclusively, a mobile radio telephone having a speed dialing facility.

Telephones are already known which include a speed dialing function allowing the user to call a telephone number stored at a predetermined location in a special abbreviated dialing memory, using a minimum number of keystrokes. For example, the commercially available TECHNOPHONE TP-2 portable cellular product includes a speed dialing function with an abbreviated dialing memory having one hundred memory locations. A telephone number stored at a predetermined memory location can be called simply by keying the two-digit location and then pressing the 'SEND' key. For example, pressing the key '1' followed by the key '2' followed by the key 'SEND' will initiate a call to the telephone number stored at memory location 12. The abbreviated dialing memory may be programmed by the user for storing frequently-used numbers at chosen memory locations. Only three keystrokes are required to initiate a call to any of the telephone numbers stored in the abbreviated dialing memory.

Other commercially available mobile telephones have a number of dedicated keys for so-called super-speed dialing. These dedicated keys can be programmed by the user for storing selected numbers which can then be dialed using only a single keystroke. In other words, pressing one of the

dedicated super-speed dialing keys will initiate a call to the pre-programmed telephone number associated therewith. Examples of mobile telephones with one touch dedicated dialing keys are the UNIDEN CP 1900 and OKI 830 products. The UNIDEN CP 1900 has three dedicated one touch dialing keys labelled "1", "2", and"3" respectively, whereas the OKI 830 has two such keys labelled "M1" and "M2" respectively.

Although super-speed dialing has the advantage that only a single key stroke is required to initiate a call, it has the disadvantage that special additional keys are required on the telephone keypad. This tends to make the keypad look more complicated and less user-friendly. Also the use of dedicated keys requires a larger keypad area, which is not compatible with smaller, more compact telephone handsets.

According to the present invention there is provided a telephone comprising a plurality of keys each having a respective telephone dialing digit associated therewith, memory means for storing telephone number information, means for determining the duration of a key press, means responsive to the determining means for selecting the respective associated dialing digit when a predetermined key is pressed for a period of time less than a threshold value, and for dialing a telephone number stored at a predetermined memory location in said memory means when said predetermined key is pressed for a period of time greater than or equal to the threshold value.

In the present context, the term telephone dialing digit includes the characters '*' and '#' in addition to the numeric digits 0,1,..9.

A telephone in accordance with the present invention has the advantage that a pre-programmed number can be called using only a single keystroke, i.e. with one touch dialing, but without increasing the number of keys conventionally found on a telephone handset. This is achieved in that one or more of the standard set of telephone keys (0,1,..9,*,#) have a dual function.

In a particular embodiment the "*" and "#" keys are dual function keys. Pressing either of these keys for less than a pre-set time selects the dialing digit '*' or '#' respectively. Pressing one of these keys for longer than the pre-set time will dial and initiate a call to a first telephone number stored at a first predetermined memory location in a telephone number memory, and pressing the other of these keys for longer than the pre-set time will dial and initiate a call to a second telephone number stored at a second predetermined memory location in the telephone number memory.

Another key, specifically the "9" key, which may be coloured red in order to distinguish it from the other keys, may initiate a call to a pre-stored emergency number (such as 911 or 999) when it is depressed for longer than a pre-set time. The pre-set time needed to press the "9" key to initiate a call to an emergency number may be longer than the pre-set time for initiating one-touch speed dialing from other keys. This measure helps to avoid the

nuisance of accidentally placing a call to the emergency number.

An embodiment of the invention will now be described, by way of example with reference to the accompanying drawings, in which:

Figure 1 is a functional block diagram of a mobile telephone in accordance with the present invention;

Figure 2 is a plan view of a handset for the mobile telephone in Figure 1;

Figure 3 is a schematic diagram illustrating the storage of data items in the mobile telephone of Figure 1;

Figure 4 is a flowchart depicting a set of steps which may be used by the microprocessor in the telephone of Figure 1 for implementing one-touch speed dialing in accordance with the present invention; and

Figure 5 is a flowchart depicting a modified set of steps which may be used in an alternative embodiment of the invention.

The telephone apparatus shown in Figure 1 is a cellular mobile telephone comprising a transceiver 1 and all the other features conventionally found in a cellular telephone. The transceiver is present within a housing 2 and is coupled to an external antenna 3. As is conventional, a microprocessor 4,

enclosed within the transceiver housing 2, is employed to control all the basic functions of the telephone. Also enclosed within the housing 2 is a read only memory (ROM) 5 in which is stored the operating software for the telephone and which is coupled to the microprocessor 4; and a random access memory (RAM) 6, also coupled to the microprocessor 4. RAM 6 is used for the temporary storage of data while the telephone is in operation, as described in more detail below. Additionally a two-second timer 15 is coupled to the microprocessor 4 for implementing the one-touch speed dialing facility in accordance with the present invention, as discussed in more detail below.

A handset 7 is removably coupled to the transceiver housing in known manner via a conventional curly cord. In addition to a microphone (mouthpiece) and speaker (earpiece) the handset comprises a user interface including a visual display 8 and a keypad 9 coupled to a microprocessor 10 present locally in the handset. The user interface of the handset 7 is shown in more detail in Figure 2. The visual display comprises for example, a liquid crystal display 8 having two rows of eight characters. Additional indicators such as "ROAM", "CALL", "SIG", illuminated by LEDs may also be provided. The keypad 9 essentially comprises two main sets of keys, namely dialing digit keys 9a associated with the numeric digits 0,1,...9 and the characters "*" and "#" especially for dialing telephone numbers, but also for entering alphanumeric data into the telephone number store as discussed in more detail below; and a set of function keys 9b for enabling various predetermined functions or operations. The keys 9a are arranged in four rows of three keys each. As

is conventional for the dialing digit key layout of a telephone, the top row comprises keys for numbers 1, 2 and 3 respectively, the second row down for numbers 4, 5 and 6 respectively, the next row down for numbers 7, 8 and 9 respectively, and the bottom row for *, 0 and # respectively. The keys 9a are also associated with alphabet information, as follows:

The key for number 2 is associated with the alphabet characters A,B,C;
The key for number 3 is associated with the alphabet characters D,E,F;
The key for number 4 is associated with the alphabet characters G,H,I;
The key for number 5 is associated with the alphabet characters J,K,L;
The key for number 6 is associated with the alphabet characters M,N,O;
The key for number 7 is associated with the alphabet characters P,R,S;
The key for number 8 is associated with the alphabet characters T,U,V;
The key for number 9 is associated with the alphabet characters W,X,Y;
The key for number 1 is associated with the alphabet characters Q and Z, and the ASCII "space" character.

The way in which the various characters are selected in different data entry and retrieval modes is discussed below.

As is usual in cellular telephones, the function keys 9b include a "SEND" and "END" key for respectively initiating and terminating a telephone call. Another of the keys 9b is an "ON/OFF" key for turning the telephone on and off. Another of the function keys may be a menu or function key labelled,

for example, "MU". Depression of this key enables a variety of pre-set menus, the related instructions of which are stored in memory, to be viewed and selectively enabled. The various menus are selected by depressing the appropriate alphanumeric keys after depressing the "MU" key. The relevant menu is shown to the user in words or abbreviations on the display 8. For example, the user may be able to select an alpha search mode (discussed below) by appropriate menu selection.

Referring back to Figure 1, an EEPROM 11 - also coupled to the handset microprocessor 10 - is used for storing both number assignment module (NAM) data (e.g. telephone number, system ID, electronic serial number, local area emergency telephone number, local area operator telephone number) and abbreviated dialing information (i.e. a telephone number store) as described in more detail below.

When the handset 7 is coupled to the transceiver housing 2 the handset microprocessor 10 is able to communicate with the main microprocessor 4 in the housing 2 via a serial data link. The microprocessor 4 continually monitors the presence of the handset connection. Once it is established that a handset is connected the microprocessor 4 requests the handset to download the NAM data from EEPROM 11 and the NAM data is then transferred into the RAM 6. Thus, while the handset 7 is connected, the transceiver will adopt the identity (telephone number, electronic serial number) of the handset in accordance with our European patent 0,406,985. This has the advantage

that the same transceiver may be used at different times by any number of subscribers having their own handsets programmed with unique NAM data. Each subscriber will be able to receive his own calls and the charges for using the system can be levied to the appropriate subscriber's account.

As mentioned above the EEPROM 11 also includes a telephone number store or abbreviated dialing memory (ADM). The organization of the ADM will now be described with reference to Figure 3. The telephone number store typically comprises 100 records each consisting of a numeric field 8 bytes long for storing the telephone number, and a text field which suitably is also 8 bytes long. The records are stored respectively at locations 00, 01.....99. It will be understood by a person skilled in the art that up to sixteen decimal digits and up to eight alphabet characters can be stored in an 8-byte field. The telephone numbers are stored right-justified in the "numeric" field (bytes 1 to 8) and filled to the left with "F" (in hexadecimal). In the case of an empty or deleted subscriber number record, the numeric field is filled with F's (hexadecimal). The text is stored left-justified in the text field (bytes 9 to 24) and filled to the right with spaces, ASCII code "20" (hexadecimal). In the case of an empty or deleted record, the text field (bytes 9 to 24) is filled with ASCII code spaces "20" (hexadecimal).

In order to enter a telephone number the respective keys 9a on the handset are pressed once in turn and the selected digits are shown on the visual display 8. If the user wishes to initiate a call to the selected number he then simply

presses the "SEND" key 9b in conventional manner. On the other hand if it is desired to store the selected number into the ADM the user presses the store (STO) key 9b. The display 8 will then show the first empty location in the telephone number store, e.g.: "MEM 10" indicating location 10. If the user presses the "STO"key 9b again the number is stored in location 10. On the other hand if the user wishes to store the number at a particular location he first presses the relevant numeric keys 9a. Thus for example pressing the "1" key, followed by the "5" key, followed by the "STO" key would store the number at location 15. Preferably a message is shown on the display 8 before the "STO" key is pressed for the second time indicating whether the chosen location is empty in order to avoid overwriting data previously stored at the selected location.

When the "STO" key has been pressed for the second time the alphabetic data entry mode is automatically enabled and the "ALPHA" indicator 8a is illuminated on the display 8.

At this stage the alphabet characters, rather than the numeric characters, are entered when the keys 9a are pressed. For each key, one key press displays the first letter, two key presses displays the second letter, and three key presses displays the third letter. So, for example, to enter the name "ROY":

To enter the letter R in the first (left-justified) position:

Press "7" - P is displayed
Press "7" - R is displayed
Press "STO" - R is entered and cursor moves to the second position.

To enter the letter O:

Press "6" - RM is displayed
Press "6" - RN is displayed
Press "6" - RO is displayed
Press "STO" - RO is entered in the second position and the cursor moves to the third position.

To enter the letter Y:

Press "9" - ROW is displayed
Press "9" - ROX is displayed
Press "9" - ROY is displayed
Press "STO" - Y is entered in the third position and the cursor moves to fourth position.

By pressing "STO" again the name "ROY" is stored at the location in association with the telephone number entered at the preceding stage. The alphabetic data entry mode is automatically terminated and the "ALPHA" indicator 8a is accordingly extinguished.

When the handset 7 is connected to the transceiver housing 2 the microprocessor 4 also requests the handset to download data from the telephone number store, ie ADM portion of the EEPROM 11. However only the text field (alphabetic) data is downloaded but this is converted and stored as a numeric version in RAM 6, as follows. Each text field is stored in a correlated location in RAM 6 illustrated in Figure 3 as an `offset' of x. Hence data at location y in ADM 11 is stored at location x+y in RAM 6. Each alphabetic character is converted by microprocessor 4 into a numeric character according to the correspondence of characters associated with the respective keys. Thus the characters A,B,C convert to a 2; D,E,F convert to a 3 and so on. As shown in Figure 3, the name ANNE stored in the text field at ADM location 00 will be converted and stored as 2663 at RAM location x. Similarly the name BRIAN stored in the text field at ADM location 01 will be converted and stored as 27426 at RAM location x+1. Other examples are shown for the first ten locations, in Figure 3.

Also, Figure 3 shows an entry in ADM memory locations 97 and 98 for OFFICE and HQ respectively. As described in more detail below, these memory locations 97 and 98 are associated respectively with the two dual function speed dialing keys "*" and "#". The user can store a desired telephone number and associated name in these locations exactly in the same manner as described above. The memory location 99 is reserved for the last number dialed, which is automatically stored in this location. A single press of the "SEND" key automatically re-dials the number stored in location 99,

i.e. the last number dialed.

In order to recall data stored in the telephone number store portion of the EEPROM 11 an alphabetic data retrieval mode can be initiated by menu selection using the "MU" key 9b. So, for example, the alphabetic data retrieval mode may be accessed by pressing the "MU" key 9b followed by the "0" and "5" keys 9a (assuming that this function is listed at menu location 05). The message "ALPHA SEARCH" is shown on the display 8. Pressing the "MU" key again will initiate the ALPHA search mode. In accordance with the invention the individual characters of a data item to be searched are entered by pressing only once for each character the respective keys having the desired character associated therewith. For example if the user is searching for the name "HARRY" he first presses the "4" key associated with the letter H (see Figure 2). The data stored in RAM 6 is searched until a first data item is found with a 4 in the first position. Referring to Figure 3, it will be seen that the first "corresponding" data item is at location x+6, namely 436743 which correlates to the data item GEORGE at location 06 in the ADM 11. This name and telephone number stored at ADM location 06 are then shown on the display 8. The name and number may be displayed simultaneously if the capacity of the display permits, or they may be displayed sequentially. Since the displayed data item is not the item being searched the user proceeds to press the "2" key associated with the letter H. The data stored in RAM 6 is searched until a first data item is found with the digits 42 in the first two positions. Referring to Figure 3, it will be seen that the first

matching data item is at location x+7, namely 425 which correlates to the data item HAL at location 07 in the ADM 11. The name HAL and associated telephone number stored at ADM location 07 are shown on the handset display 8. Again this is not the item being searched and so the "7" key is pressed representing the letter R. The data stored in RAM 6 is again searched and a unique data item is found with the digits 427 in the first three positions. Referring to Figure 3, it will be seen that the unique matching data item is found at location x+8, namely 42779 which correlates with the data item HARRY at location 08 in the ADM 11. The name HARRY and the associated telephone number stored at ADM location are shown on the handset display 8. The search has thus been completed with only three key presses. The user can now proceed to call the displayed number simply by pressing the "SEND" key 9b.

The applicant has found in practice that most data entries in a 100-location telephone number store can be retrieved with only two or three key strokes. Referring to the example shown in Figure 3 it can be seen that ANNE will be retrieved after a single keystroke, BRIAN after two keystrokes, CAROL after two keystrokes, DAVE after one keystroke, EVA after two keystrokes, FRED after two keystrokes, HAL after two keystrokes, HARRY after three keystrokes, and HOME after two keystrokes. In this example, the maximum number of keystrokes to search and find a particular data item is only three. This rapid form of alphabetic data retrieval is the subject of our copending British patent application number 9210064.3 (our ref: PAT 92006) filed on 9

May 1992.

It is noted here that the conversion and storage of the data item text fields in numeric format has the advantage not only that comparison can be made more quickly, but also less storage capacity is required since a numeric digit can be stored in half a byte whereas a whole byte is required to store an alphabet or ASCII character. Hence, in this example only 400 bytes of memory are required to store the data from the telephone number store as a numeric version in RAM 6.

Apart from the alphabetic data retrieval mode, speed dialing is possible simply by keying in the desired memory location and then pressing the "SEND" key (i.e. three key strokes in total). Thus pressing the keys "0", "9" and "SEND" in quick succession will initiate a call to the telephone number stored at memory location 09, namely 01234567 - HOME.

In accordance with the invention one-touch speed dialing is also possible by pressing certain of the telephone dialing digit keys 9a for more than 2 seconds. The keys in question are dual function keys. More particularly, pressing the "*" key for longer than 2 seconds will automatically initiate a call to the telephone number stored at memory location 97. Similarly, pressing the "#" key for longer than 2 seconds will automatically initiate a call to the telephone number stored at memory location 98. As shown in Figure 2, the "*" and "#" keys may also be marked "EZ1" and "EZ2" respectively to

denote their 'easy dial' function.

As mentioned above, the NAM information stored in the handset EEPROM 11 and downloaded to the RAM 6 in the transceiver housing 2 may include fields respectively containing the local area emergency telephone number, e.g. 911 or 999; and the local area operator number, e.g. 100. The emergency number field may be associated with the "9" key, and the operator number field may be associated with the "0" key. The numeral "9" may be coloured red so that visually it is readily distinguishable from the other dialing digit keys 9a. Alternatively the "9" may be silhouetted on a key having a generally red background or the key may have a red border.

Figure 4 is a flowchart which may be used to implement the operation of the microprocessor 4 (see Figure 1) as far as the one-touch speed dialing is concerned. The flowchart begins at block 100 when any one of the dialing digit keys 9a or the function keys 9b is pressed. At block 101 the telephone determines which type of key has been pressed. If a function key 9b has been pressed the flow proceeds to block 102 and an appropriate function routine is started depending on which key is pressed. The function routines are not discussed further here. On the other hand, if the pressed key is any one of the dialing digit keys 9a, i.e. for the numeric digits 0,1,....9 or for the characters "*" or "#", the 2 second decremental timer 15 (see Figure 1) coupled to the microprocessor 4 is decremented at block 103. At block 104 the duration of the key press is tested. If the elapsed time since the key was

pressed is less than two seconds, i.e. $t<0$ sec, the flow proceeds to block 105. If the key has not yet been released the flow proceeds back to block 103 where the timer is further decremented. On the other hand, if at block 105 it is determined that the key has now been released, i.e. the duration of the keypress was less than 2 seconds, the timer 15 is stopped and reset at block 106. Flow then proceeds to block 107 at which the keyed digit is selected in the usual manner, e.g. for regular dialing purposes.

If at block 104 it is determined that $t=0$, i.e. the key has been pressed for 2 seconds or longer, flow proceeds to block 108 at which the timer 15 is reset, and then to block 109. If the pressed key is any one of the digits 1-8 then the long key press is effectively ignored and the keyed digit is selected at block 107 in the usual manner. This is because the keys associated with the numeric digits 1,2,...8 are single function keys.

On the other hand, if the pressed key is not one of the digit keys 1,2,....8, flow proceeds from block 109 to block 110. If the pressed key is the "9" key then the emergency telephone number is retrieved from the appropriate NAM field stored in RAM 6 at block 111 and a call to the emergency telephone number is automatically initiated at block 112 without the user pressing any further keys.

If the pressed key is not a "9", the flow proceeds from block 110 to block 113. If the pressed key is the "0" key then the operator telephone number is

retrieved from the appropriate NAM field stored in RAM 6 at block 114 and a call to the emergency telephone number is automatically initiated at block 115 without the user pressing any further keys.

If the pressed key is not a "0", the flow proceeds from block 113 to block 116. If the pressed key is the "*" key then the telephone number stored at ADM location 97 is retrieved from the ADM 11 at block 117 and a call to the retrieved telephone number is automatically initiated at block 118 without the user pressing any further keys.

Finally, if the pressed key is not a "*", the pressed key is assumed to be a "#" and the flow proceeds from block 116 to block 119. The telephone number stored at ADM location 98 is retrieved from the ADM 11 at block 119 and a call to the retrieved telephone number is automatically initiated at block 118 without the user pressing any further keys.

The telephone described herein thus has four one-touch dual function speed dialing keys, namely the "*", "#", "0" and "9" keys. When the "*" or "#" keys are pressed for longer than 2 seconds the respective telephone numbers stored in the ADM memory locations 97 and 98 are retrieved and dialed automatically. On the other hand, when the "9" or "0" keys are pressed for longer than two seconds automatic dialing is initiated to the emergency telephone number or the operator telephone number respectively, these numbers being retrieved from the data included in the NAM data.

In an alternative embodiment it may be arranged that the "9" key has to be pressed for a longer time (eg 4 seconds) before a call to the pre-stored emergency number is initiated. This measure helps to guard against inadvertent, short-duration key presses which would otherwise unintentionally place a call to the emergency number.

Thus, with reference to Figure 5, when it is determined at block 110 that the "9" key has been pressed, the 2 second decremental timer 15 (see Figure 1) coupled to the microprocessor 4 is again decremented at block 120. At block 121 the extended duration (ie the time in excess of the first 2 second period) is tested. If the extended time is less than two seconds, ie $t<0$ sec, the flow proceeds to block 124. If the "9" key has not yet been released the flow proceeds back to block 120 where the timer is further decremented. On the other hand, if at block 124 it is determined that the key has now been released, ie the extended duration of the keypress was less than 2 seconds (so the total duration of the "9" keypress was less than 4 seconds), the timer 15 is stopped and reset at block 125. Flow then proceeds to block 107 at which the "9" digit is selected for regular dialing purposes and a call to the emergency number is not initiated.

If at block 121 it is determined that $t=2$ seconds, ie the "9" key has been pressed for 4 seconds or longer (in total), flow proceeds to block 126 at which the timer 15 is reset, and then to block 111 at which the emergency telephone number is retrieved from the appropriate NAM field stored in RAM 6. A call

to the emergency telephone number is then automatically initiated at block 112 without the user pressing any further keys.

It will be understood that in Figure 5 the steps shown within the broken-line boundary are the additional steps, over those shown in Figure 4, for implementing the differential timing for one-touch speed dialing to the emergency number. That is to say, the time needed to press the "9" key in order to place a call to the emergency number is longer than the time needed for initiating one-touch speed dialing from other keys.

In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the present invention. For example keys other than the "*", "#", "9" and "0" keys may be provided with the dual function one-touch speed dialing facility. Also, more or less than four keys may be utilized for dual function one-touch speed dialing keys. Specifically the full set of dialing digit keys 9a may be utilized as dual function one-touch speed dialing keys.

Finally it is noted that the present invention may be applied in other kinds of telephone, for example cordless telephones or standard land-line telephones.

Claims

1. A telephone comprising

a plurality of keys each having a respective telephone dialing digit associated therewith,

memory means for storing telephone number information,

means for determining the duration of a key press,

means responsive to the determining means for selecting the respective associated dialing digit when a predetermined key is pressed for a period of time less than a threshold value, and for dialing a telephone number stored at a predetermined memory location in said memory means when said predetermined key is pressed for a period of time greater than or equal to the threshold value.

2. A telephone as claimed in claim 1, including first and second keys having first and second dialing digits associated respectively therewith, wherein the selecting and dialing means is adapted to select the first digit when said first key is pressed for a period of time less than a first threshold value, and to dial a first telephone number stored at a first predetermined location when said first key is pressed for a period of time greater than or

equal to said first threshold value; and to select the second digit when said second key is pressed for a period of time less than a second threshold value and to dial a second telephone number stored at a second predetermined location when said second key is pressed for a period of time greater than or equal to said second threshold value.

3. A telephone as claimed in claim 2, wherein the first key has the dialing digit "*" associated therewith, and the second key has the dialing digit "#" associated therewith.

4. A telephone as claimed in any of the preceding claims, wherein the selecting and dialing means is adapted to dial an emergency telephone number stored in the memory means when a predetermined key is pressed for a period of time greater than or equal to a threshold value.

5. A telephone as claimed in claim 4, wherein the predetermined key for the emergency number has the dialing digit "9" associated therewith.

6. A telephone as claimed in claim 4 or claim 5, wherein the predetermined key for the emergency telephone number is visually distinctive from the other dialing digit keys.

7. A telephone as claimed in claim 6, wherein the predetermined key for the emergency telephone number is distinguished by the colour red.

8. A telephone as claimed in any of claims 4 to 7, wherein the threshold value for the key press duration associated with the predetermined key for the emergency number is greater than the threshold value for the key press duration associated with at least one other key.

9. A telephone as claimed in any of the preceding claims, wherein the selecting and dialing means is adapted to dial an operator telephone number stored in the memory means when a predetermined key is pressed for a period of time greater than or equal to a threshold value.

10. A telephone as claimed in claim 9, wherein the predetermined key for the operator telephone number has the dialing digit "0" associated therewith.

11. A telephone as claimed in any of the preceding claims, in the form of a mobile radio telephone.

12. A telephone substantially as herein described with reference to Figures 1 to 5 of the accompanying drawings.

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Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
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Category	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2010641 A	
A	GB 1320895	

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